

Combinations of Earth orientation Measurements: SPACE95, COMB95, and POLE95

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A Kalman filter has been used to combine independently determined measurements of the Earth's orientation taken by the modern, space-geodetic techniques of very long baseline interferometry, satellite laser ranging, lunar laser ranging, and Global Positioning System interferometry. Prior to combining the measurements, UT1 tidal terms were removed, outlying data points were deleted, series-specific corrections were applied for bias and rate, and the stated uncertainties of the measurements were adjusted by multiplying them by series-specific scale factors. Values for these bias-rate corrections and uncertainty scale factors were determined by an iterative, round-robin procedure wherein each data set is compared, in turn, to a combination of all other data sets. When applied to the measurements, the bias-rate corrections thus determined make the data sets agree with each other in bias and rate, and the uncertainty scale factors thus determined make the residual of each series (when differenced with a combination of all others) have a reduced chi-square of one. The corrected and adjusted series are then placed within an IERS reference frame by aligning them with the IERS Earth orientation series 1 X)1' (IERS) C 04. The resulting combination of corrected, adjusted, and aligned Earth orientation series is designated SPACE95 and spans October 6, 1976 to February 10, 1996 at daily intervals.

Two additional combinations of Earth orientation measurements have been generated by combining optical astrometric measurements with the space-geodetic measurements used to form SPACE95. COMB95, formed by additionally incorporating the BII optical astrometric measurements, spans January 20, 1962 to February 6, 1996 at 5-day intervals. POLE95, formed by additionally incorporating both the BII and IIS optical astrometric measurements, consists of just the polar motion components of the Earth's orientation and spans 1900-1995 at monthly intervals.